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ABSTRACT

This paper describes the processes and techniques used to improve and streamline the standard student reports used at Purdue University (Indiana). Various models for analyzing reporting processes are described, especially the model used in the study, the Shewart or Deming Cycle, a method that aids in continuous analysis and improvement through a four step process -- plan, do, check, and act. The model was applied to enrollment reports (using Microsoft Excel for calculations), a database for tracking ad hoc information requests was developed (using Microsoft Access database software), the statewide enrollment report was improved by using Microsoft Access, and the quality of reports was improved by using survey information. The paper concludes that utilizing appropriate technology within the Deming model has reduced the amount of labor needed for creating reports and improved the accuracy and timeliness of the reports. (Contains 16 references.) (DB)

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Effective Report Preparation: Streamlining the Reporting Process

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Effective Report Preparation: Streamlining the Reporting Process

Abstract

With improved technology and the increased demand for more information in a timely manner, preparing reports quickly and accurately has become increasingly important for institutional researchers. Preparation of reports was improved to take advantage of the most efficient technology and to better meet user needs. Specifically addressed are ways in which reports were streamlined including use of Microsoft Access software for tracking ad hoc data requests and preparing an enrollment report from beginning to end; using SAS/CONNECT to allow for more direct access to mainframe data; and surveying users to provide insight on how to improve an academic performance report.

Effective Report Preparation: Streamlining the Reporting Process

Introduction

Utilizing the most effective technology to meet reporting needs and determining the most efficient way to prepare reports is an important and on-going concern for institutional researchers (Krotseng, McLaughlin, & Eimers, 1998). Developing a strategy to evaluate reporting activities and using methods of report preparation that take fullest advantage of current technology help to meet this goal (McLaughlin, Howard, & McLaughlin, 1998; Sanford, 1995).

One of the top priorities of the student research area at our institution in recent years has been to streamline reports. Reports on enrollment, degrees conferred, academic performance, and retention are prepared on an annual or semester basis. In the not too distance past, some reports were prepared by manually entering data into word processing documents from hard copy reports, and in some instances, manually doing the calculations. While every institution has unique needs and ways in which reports are prepared and utilized, there are common processes that must be understood to take fullest advantage of technology and to meet user needs. Receiving accurate and timely reports is critical for every institution of higher education. Institutional researchers particularly understand the importance of finding better ways to prepare and present data to meet the needs of decision-makers.

In order to reduce the time allocated for report preparation, processes were created that utilized appropriate technology to meet the university goal of doing more with less. The process used to streamline our student report preparation has reduced the amount of labor needed for creating reports and improved the accuracy and timeliness of

the reports. Surveying our users has given us information that has been used to better serve their needs. This paper covers the processes and techniques used to improve and streamline the standard student reports used at our institution.

Models of Analyzing Reporting Processes

Advances in technology have greatly impacted the way we work. More data are available today than ever before and expectations are high for accurate reports prepared in record time. There are several concepts of analyzing reports or processing decisions to develop new ideas and overall streamlining. Below are some of the models we found useful.

McLaughlin, Howard, Balkan & Blythe (1998) have identified key elements for those who work with information. The first key element is that change is perpetual. Second, as institutional research professionals, we must embrace change or we will become obsolete. Finally, ideas are used as a key source of influence and change. Throughout the implementation of these steps we have utilized two primary learning disciplines described by McLaughlin, et al. One of which was a shared vision. A shared vision is when team participants hold a deep commitment to a commonly held purpose, such as streamlining report preparation. We are bound together by this shared aspiration. The discipline of team learning occurs with the alignment of the individual team members in the process of working together toward the next higher level of awareness (McLaughlin, et al., 1998).

A model, by R.A. Howard (1988), that looks at the analysis process states that quality of the decision is guaranteed by performing the actions required in each step. The very basis of a vision is the steps it follows. Although the team members' "shared vision"

may increase the quality, just having steps to follow helps the process. Although the steps may be considered a formality, "the mere discipline of getting the people together and working through the process will yield benefits and continuous improvement" (deKlerk, 1994, p. 21).

Another model of the analysis process is by J.E. Matheson (1992). Matheson (1992) identifies six links needed to obtain a quality decision in his "decision quality chain." The decision quality chain outlines steps taken by the team members. Link 1, the Appropriate Frame, views the problem. The correct perspective, such as strategic problem or operational problem, must be identified, as the real problem, not the apparent one. Link 2, Creative, Doable Alternatives, creates a set of alternatives. This is more than simply another concept, but a well thought out formula. Link 3 is Meaningful, Reliable Information; useful information is required to make relevant decisions. The information will primarily influence the outcome of the decision and the uncertainty associated with the factors. Link 4, Clear Values and Trade-offs explain end results in clear, expressed terms of values and the relative importance of each value. Link 5 is Logically Correct Reasoning. Analysis and determination of the value of information is completed. In Link 6, Commitment to Action, the decision making process should be followed through with implementation (deKlerk, 1994).

Another element that we use in analyzing our reporting process is evaluation. A model developed by Stufflebeam (1971) adds several practical criteria necessary to the definition of evaluation. These criteria are relevance, importance, scope, credibility, timeliness, pervasiveness, and efficiency. In addition to the criteria, there are three major

types of evaluation. Frenchtling, Stevens, Lawrenz, & Sharp (1995) suggests three major types of evaluation prototypes:

1. Planning Evaluation: A planning evaluation assesses the understanding of project goals, objectives, strategies and timelines.
2. Formative Evaluation: A formative evaluation assesses ongoing project activities. It consists of two types: Implementation Evaluation and Progress Evaluation:

    a) An Implementation Evaluation assesses whether the project is being conducted as planned.

    b) A Progress Evaluation assesses the progress made by participants in meeting the project goals.
3. Summative Evaluation: A Summative Evaluation assesses project success - the extent to which the completed project has met its goals (Frenchtling, et al., 1995).

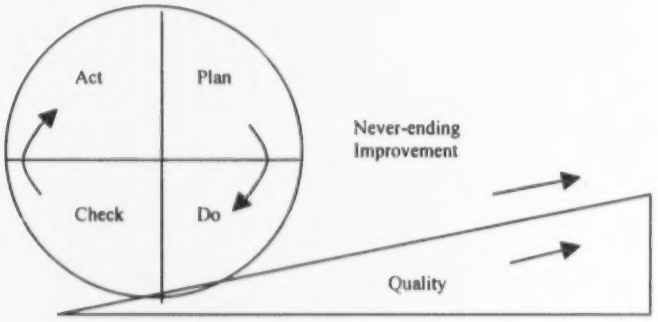
We have used the Summative Evaluation technique to evaluate our reports. In this category evaluation is determined successful if it meets the project's original goals. Frenchtling, et al. also suggested five phases for conducting an evaluation:

1. Develop Evaluation Questions
2. Match Questions with Appropriate Information-Gathering Techniques
3. Collect Data
4. Analyze Data
5. Provide Information to Interested Audiences

(Frenchtling, et al., 1995)

The five phases were found useful when evaluating the results of our new streamlined report processes.

However, the theory or model we found most useful and applicable is probably the most recognized model, which is the Shewart or Deming Cycle. The Shewart Cycle renamed the Deming Cycle, is a method that aids in continuous analysis and improvement. It is composed of four basic stages that occur over time: a Plan stage, a Do stage, a Check stage, and an Act stage (Sherkenback, 1992). A decision-maker recognizes an opportunity and develops a plan (1st stage - Plan), she tests the theory by implementing the plan on a small scale or a trial bases (2nd stage - Do), she monitors the effects and observes the test results (3rd stage - Check), and acts on the opportunity and takes appropriate actions (4th stage - Act). Since these actions lead to a new or revised plan, the cycle is a never-ending improvement. A diagram of the Shewart/Deming Cycle is shown below.



In the first stage, Plan, a strategy is developed. A collection of data is helpful for what must be accomplished. The data can assist when determining the effects of manipulating or changing the streamlining process. When the second stage, the Do stage, is conducted, a plan should be implemented in a small scale. Once the team members

have been educated and trained, the plan may be set into motion. In the Check stage, the plan is monitored to answer two questions. First, is the process behaving according to the plan and second, are the effects of the plan creating problems or improvements? The results of the studies in this Check stage lead to the Act stage. The purpose of the Act stage is to implement modifications to the overall process. No matter what, the cycle returns to the Plan stage. If it was learned that the process did not have the desired outcome, the cycle returns to the Plan stage to search for alternatives. If it did produce the desired results, it will lead back to the Plan stage to determine the optimal levels of the process improvements. Consequently, the cycle continues in the never-ending improvement of the process (Gitlow, Gitlow, Oppenheim, Oppenheim, 1989).

Our own method of analyzing the report process incorporates all of the elements listed above. Our attempt to change grew out of the idea that we wanted to streamline our reporting processes to take better advantage of technology. Ultimately, these ideas evolved through a number of steps:

Identify Need to Change

Define Current Processes

Identify Problem Areas

Brainstorm How to Correct Problems

Investigate Alternatives

Develop a Process for Implementation

Evaluate the Effectiveness of Changes Made

As one can see, several elements from the above mentioned models were incorporated into our own method. We found the Deming model straightforward,

complete, and applicable to our approach. (However, we skip the trial run and implement stage four, Act, before stage three, Check.) Our approach fits within the Deming model. Within first stage, Plan, we identified the necessity of upgrading, because as McLaughlin et al. (1998) noted, change is perpetual and necessary. During this stage we also defined the current process, similar to Matheson's (1992) viewing the problem in the correct perspective. Matheson (1992) and Deming noted the need to collect data, which we did as a part of identifying the problems. As Howard (1988) stated, we found that just having outlined steps helped us organize our plan. As in Deming's second stage, Do, we brainstormed solutions to possible problems. Creating alternatives was considered critical in Matheson's model. McLaughlin, et al. also noted that aligning team members in a shared vision is necessary in meeting the goal. In the Act stage, we implemented our idea by following the steps we had created, as Matheson recommends, and in the Check stage, we evaluated the effectiveness of the process. The evaluation theories of Stufflebeam (1971) and Frenchtling et al. (1995) helped us organize our evaluation to determine if we were meeting our original goals.

Implementation Examples

As noted earlier, technology has greatly impacted Institutional Research. Although it has become easier to create reports in some ways, expectations have also increased. Also, technology is continually changing and improving. Technology that was used ten or 15 years ago to prepare reports is likely to be woefully inadequate today. There has been dramatic change. Determining the best technology for preparing a specific report can be a significant challenge. Sometimes the choice of which technology to use is clear, sometimes it is not. Much is dependent on the source of the data, the skill

and training levels of the staff available, the time available to understand and to use the technology, and, of course, the capabilities of technology itself. With the advances in technology and the increased demands for information, it is imperative that tools to translate data into reports be the most effective and efficient possible.

The Never-ending Improvement of an Enrollment Report

In the not too distance past, enrollment reports prepared each semester at our institution required a significant amount of manual data entry. "Official" hard-copy paper reports were generated from Cobol programs on the mainframe computer. These extensive reports were then summarized into a report that was condensed in format, was more appealing to the eye, and was significantly shorter. The data from the "official" reports were read from the hard-copy and manually entered into a word processing document with the calculations done by hand.

A big technology advance was made several years ago by moving the report from the word processing document to a Microsoft Excel file. This allowed the calculations to be done by the software, but still required manual data entry. Over the years, improvements to the spreadsheet has been made by creating links so that information that is reported on more than one spreadsheet need not be entered multiple times. Checks have been built into the spreadsheets that check for data accuracy and consistency.

Although this has been a big improvement, it has not been enough. Manually entering data into a spreadsheet with all the technology available today is not sufficient. Through the process described above, we have identified the problem areas, investigated the alternatives, and developed a process for implementation. We want to be able to update the spreadsheet directly from a computer file. This will require working with staff

from the computing center who maintain the "official" report programs so that the same data source can be made available to us. Once we have the source data, we will use SAS to extract the data from the mainframe to feed into a Microsoft Access database and then manipulate the data in Access to get it into the appropriate Excel format. We want to retain the format as it currently exists in Excel and have decided not to use Access or SAS to create the report at this time. However, these may be viable alternatives in the future. It truly is an on-going process.

Developing a Database for Tracking Ad Hoc Information Requests

One of the most valuable new reporting tools is Access, a Microsoft database product. This product has increased efficiency and decreased the amount of time for report preparation and manual labor. The potential for using Access for reporting purposes at all stages of report preparation is virtually limitless.

With responsibility for responding to ad-hoc requests which from a wide variety of internal and external constituents, keeping track of requests is essential. In the past, our tracking was done by filling out a paper form for basic information including who, when, what, and how. Once the forms were collected at the end of the month, a tally was created to see what topics were the most frequently requested and how long the requests took to complete.

Two years ago, an Access database was created to store the information on these ad-hoc requests. We recognized the need to move this "paper-pushing" method online. We defined the process and identified key sections of tracking the ad hocs. It was obvious that a database would best fit our process, and Access was available to us. After the implementation we evaluated the new system of tracking by simple comparison. It

went above and beyond our original goals. The information can now be accessed from the database and summary reports can readily be generated. However, the greatest benefit of moving the ad-hoc requests to Access has been the organization of the requests. Instead of sorting through a file of several requests, searches can be done in a few seconds. Another advantage of using a database is being able to search for a request in several ways. If an ad-hoc report was requested earlier by another person or another department, the request can be found easily, saving time sorting through the filing cabinet.

Using an Access Database for Statewide Enrollment Reporting

Access has also been used to recreate a statewide enrollment report. Enrollment data are received from most of the public and private institutions of higher education in the state and a summary report is prepared annually, which includes historical information. In the past, this report was created using multiple software applications, using both mainframe and personal computers. Instead of using a combination of mainframe files, Microsoft Word, and Excel, the entire process now has been moved into Access.

Before using Access, the data were entered manually into mainframe files and several programs were run to check the data and create the data tables. These tables were exported into Excel (which was an improvement from using a word processor where manual calculations were used previously) and then cleaned up into the format desired for the final report. The mail merge capability of Word was used to generate letters and create labels for mailings as well as for preparing the title page and the table of contents page.

Because of an upcoming deadline for removing the reporting language used in the first step of the manipulation of the data, we knew we had to convert at least part of the process. We analyzed the process and outlined the important components. There were several alternatives, but in the end we choose Access. Our decision was based on the idea to use only one tool for the entire report. Not only was this due to training, but we were also concerned that if we used multiple software packages, compatibility problems may arise.

The project to move the report to Access was undertaken in several stages, the first of which was to create data tables. Once the tables were completed, queries were created to check and clean the data. A report was produced to recreate the tables that were once created using the older report technology. Also, the letters sent to recipients of the report are stored in Access and merged with the address data table. The ultimate step, which has not yet been completed, will be to use the web for data input. The institutions will be able to enter their own information, which can then be downloaded, directly into Access. Once that step is finished, the entire report will be in Access and it will be updated by the institutions.

We have only done the initial report so our evaluation of it is somewhat limited. Although, the report section was more complicated than anticipated, overall, our goals were met and we found the whole process more efficient. The benefits of having the whole report in Access have been not only more efficiency, but also the ability to easily add data history and graphs.

Using Survey Information to Improve the Quality of Reports

As part of the overall effort to improve reports, a survey was conducted of the recipients of a report on academic performance of undergraduate students which is prepared each fall and spring term. The benefit of understanding users needs is an essential component of any effective report (Frost, & Beach, 1994).

Preparation of the Academic Performance Report takes a considerable amount of time and effort, yet we rarely received ad hoc requests that required information from this specific report. We tried to figure out what was the most important information to provide and if there was anything that was unnecessary included in the report. A written questionnaire was given to 57 recipients of the report concerning the portion they used most and least often, the frequency of use, and their opinions about a Web site option for posting the report. A response rate of 56% was obtained. The results of the survey showed that many of the users were satisfied with the format and content of the report, but their use was infrequent. Additionally, and significantly, respondents indicated that publishing this report on the world wide web would meet their needs. The survey was a way to see how we could improve the quality of the Academic Performance Report, and served as a check, as suggested by the Deming Cycle.

Following is the application of the evaluation model we used to evaluate the Academic Performance Report.

Frenchtling, et al. Evaluation Model	**Action Taken**
1. Develop Evaluation Questions	Figure out how best to evaluate the report.
2. Match Questions with Appropriate Information-Gathering Techniques	Created a survey to ask our readers about what information they used.

3. Collect Data	Sent out a two page questionnaire to our report recipients with a follow-up phone call.
4. Analyze Data	Analyze survey results.
5. Provide Information to Interested Audiences	Summarized the survey results and shared with colleagues and report recipients.

Using SAS to Streamline Report Preparation

SAS is an invaluable tool for institutional researchers and can be used in multiple ways for reporting (Kunselman, 1997; Williams, 1996). SAS has played a significant role in streamlining our report preparation process. A relatively new feature of SAS and recently available to us is SAS/Connect. This product allows direct access to mainframe data while using SAS on a PC (Garner & Polzin, 1996). Utilizing this capacity of SAS has allowed us to prepare a final report in one step rather than multiple steps.

In the past, the method for preparing the retention report, which is a combination of table and graphs, was to run a SAS program against a mainframe file, transfer the mainframe output to a word document, and then manually enter data into Harvard Graphics. Now SAS/Connect is used to prepare the tables, by running a program against the mainframe file from the PC and directly using the SAS output as the report. This has simplified the procedure immensely by reducing the time for preparing the report and removing the possibility of errors from manual manipulation to the tables.

The preparation of the graphic sections of the retention report was also streamlined. Originally, the data were exported from SAS PC to Excel and linked to

Harvard Graphics. However, the version of Harvard Graphics available to us could not import the data into our version of Excel. The problem was solved with the new version of Harvard Graphics, which was able to link to Excel. (It is our goal to improve the proofing procedure by using Excel as a check of the data.) In Excel we created formulas for the calculations instead of hand calculation as before. The next step in our effort to continually improve our report preparation, will be to export the data from SAS into Excel. As shown, the streamlining of this report is a perpetual process.

Continuous Improvement

As we use the Deming Cycle and our own method to strive for never-ending improvement, we are also looking for new technology to utilize. SAS/Share, which is currently being tested at our institution, will be implemented in the near future. SAS/Share serves two basic purposes. SAS/Share allows access of multiple users to the same SAS datasets simultaneously on the mainframe. Another benefit of SAS/Share is the ability to utilize other software, such as Brio, to access a SAS dataset on the mainframe. This would allow Brio users to access current data to prepare reports more quickly and easily without having to develop the more demanding programming skills needed in SAS.

Summary

Receiving accurate and timely reports is critical for every institution of higher education. Creating a process that utilizes appropriate technology to reduce the time allocated for report preparation helps meet university goals of doing more with less. Following the Deming Cycle -- Plan, Do, Check, Act, being ever mindful of never-

ending quality improvement has been a useful model. Adapting this model for our specific needs in streamlining the reporting process has been a successful experience. The process used to streamline our student report preparation process has reduced the amount of labor needed for creating reports and improved the accuracy and timeliness of the reports. Our shared vision has deepened the commitment among staff members for our commonly held purpose. Surveying our users has given us information that has been used to better serve their needs and helped us understand how to improve the quality of our reports.

As institutional researchers we understand the importance of always thinking of better approaches for preparing and presenting data to meet the needs of decision-makers. Streamlining reports is one way in which we can work smarter, not harder.

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